

**WHAT IS CLAIMED IS:**

1. A gain-clamped semiconductor optical amplifier comprising:  
a gain waveguide for amplifying an optical signal input to the gain waveguide; and  
5 a grating layer having a first grating on a portion of the grating layer, the first grating being disposed at a first end portion,  
wherein the gain waveguide is disposed on the grating layer in contact with the first grating.
- 10 2. The gain-clamped semiconductor optical amplifier as claimed in claim 1, further comprising a second grating disposed at a second end portion.
3. The gain-clamped semiconductor optical amplifier as claimed in claim 1, further comprising a clad laminated on the gain waveguide.
- 15 4. The gain-clamped semiconductor optical amplifier as claimed in claim 2, wherein the first and the second gratings have reflection factors different from each other.
5. The gain-clamped semiconductor optical amplifier as claimed in claim 1,  
20 wherein the gain waveguide includes a mode conversion region formed at one end portion of the gain waveguide, the mode conversion region having a width which becomes narrower or wider as it goes to an end adjacent to the semiconductor optical amplifier.

6. The gain-clamped semiconductor optical amplifier as claimed in claim 5,  
wherein the mode conversion region is not in contact with the first grating.

5         7. The gain-clamped semiconductor optical amplifier as claimed in claim 5,  
wherein the mode conversion region is in contact with a portion of the first grating.

8. The gain-clamped semiconductor optical amplifier as claimed in claim 2,  
wherein the gain waveguide includes mode conversion regions formed at both sides of the  
10 gain waveguide, the mode conversion regions having a width which becomes narrower or  
wider as it goes to a corresponding end of the semiconductor optical amplifier.

9. The gain-clamped semiconductor optical amplifier as claimed in claim 8,  
wherein the mode conversion regions are not in contact with the first and the second  
15 gratings.

10. The gain-clamped semiconductor optical amplifier as claimed in claim 8,  
wherein each of the mode conversion regions are in contact with a portion of a grating  
adjacent to the mode conversion region.

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11. The gain-clamped semiconductor optical amplifier as claimed in claim 1,  
further comprising non-reflection layers disposed on two portions of the semiconductor

optical amplifier.

12. The gain-clamped semiconductor optical amplifier as claimed in claim 2,  
further comprising non-reflection layers disposed on two portions of the semiconductor  
5 optical amplifier.

13. The gain-clamped semiconductor optical amplifier as claimed in claim 1,  
further comprising:

a non-reflection layer disposed on a first end surface of the semiconductor optical  
10 amplifier, the first end surface serving as an input/output side of the semiconductor optical  
amplifier; and

a high reflection layer disposed on a second end surface of the semiconductor  
optical amplifier.

15 14. A semiconductor optical amplifier comprising:

a gain waveguide arranged to amplify an optical signal input to the gain  
waveguide, the optical signal being input and an amplified optical signal being output  
through a first end surface of the semiconductor optical amplifier; and

a grating layer having a grating on a portion of the grating layer,  
20 wherein the gain waveguide is disposed on the grating layer in contact with the  
grating.

15. The semiconductor optical amplifier as claimed in claim 14, wherein the grating layer has another grating on another portion of the grating layer.

16. The semiconductor optical amplifier as claimed in claim 15, wherein grating  
5 and the another grating have reflection factors different from each other.

17. The semiconductor optical amplifier as claimed in claim 14, wherein the gain waveguide includes at least one mode conversion region.